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Poster abstracts

Diagnostic medical radiation exposure and risk of childhood leukaemia: results from an Italian population-based case-control study

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Introduction

In utero exposure to low-dose radiation delivered from medical x-rays is a risk factor for childhood leukaemia (CL), although the magnitude of the risk has substantially dropped with the implementation of radiation protection standards. On the converse, the findings for postnatal exposure to low-dose medical radiation and the risk of CL are still inconsistent (Krille *et al*, 2015; Mercuri *et al*, 2013; Pearce *et al*, 2012). In a population-based case-control study carried out in a Northern Italian province we explored the relationship between post-natal exposures to medical radiation and CL risk.

Methods

We identified the 51 CL cases diagnosed from 2004 to 2013 in the Modena province (700.000 inhabitants) through the Italian National Childhood Cancer Register. For each case, we randomly selected four population controls matched by age, sex and calendar year. For each study subject who had accessed the Radiology services of the two major hospitals in the province, we retrieved detailed information about any medical procedure involving ionizing radiations from birth up to six months prior to the onset of the disease. We collected information about child age, type, total number, body region and reason of the radiological examination. After considering for each procedure the age-specific maximum irradiation dose allowed by the National Diagnostic Imaging guidelines, we estimated for each study participant the total effective dose (mSv) and the red bone marrow-specific dose (mGy) experienced from birth.

Results

Using a conditional logistic regression model we found an increased risk of developing CL, especially in children aged 5 or more, in association with experiencing one or more diagnostic tests with ionizing radiation (OR = 1.68, 95% confidence interval 0.66–4.29). The risk of CL and particularly of Acute Lymphoblastic Leukaemia increased in children who received one or more x-ray test in the first 5 years of life. Risk of CL by increasing total effective dose and red bone marrow-specific dose increased in the highest (>0.035 mSv and >0.0125 mGy) exposure category compared to the lowest one (0 mSv/mGy), with a OR of 1.81 (0.74–4.45) and 2.05 (0.82–5.11), respectively.

Conclusions

Our study suggests an increased risk of CL related to early exposure to post-natal medical radiation.

References

Mercuri *et al*, (2013) Evid Based Med 18: 158 – 9

Pearce *et al*, (2012) Lancet 380: 499 – 505

Krille *et al*, (2015) Radiat Environ Biophys 54: 1 – 12